JOURNAL OF
NEUROPHYSIOLOGY

VOLUME 69, 1993

CHIEF EDITOR

Gordon M. Shepherd

ASSOCIATE EDITORS

Wayne E. Crill
Nigel W. Daw
Mark L. Mayer
Allen I. Selverston
Peter L. Strick
Nobuo Suga

EDITORIAL BOARD

Denis A. Baylor
Robert Burke
David P. Corey
Sol D. Erulkar
Charles D. Gilbert
Michael Goldberg
Patricia Goldman-Rakic
Ann Graybiel
Ziaul Hasan
Stephen Highsten
Thomas M. Jessell
Kenneth O. Johnson
Daniel Johnston
Christof Koch
Robert H. LaMotte
Charles Liberman
Alan R. Light
Eve E. Marder
A. Robert Martin
Roger A. Nicoll
Donata Oertel
Keir G. Pearson
Rami Rahamimoff
Wilfrid Rall
S. Murray Sherman
Steven A. Siegelbaum
Jun Tanji
Janis Weeks
Frank S. Werblin

PUBLICATIONS COMMITTEE

L. R. Johnson, *Chair*
D. L. Kunze
L. M. Mendell
L. B. Rowell
J. A. Williams

Ex officio
B. B. Rauner
Publications Manager
and Executive Editor
S. G. Schultz, *President*
M. Frank, *Executive Director*

EDITORIAL STAFF

L. Chambers
Production Manager
J. Adelman
Copy Editor

Published monthly by
THE AMERICAN PHYSIOLOGICAL SOCIETY
9650 Rockville Pike, Bethesda, MD 20814-3991

Contents of Volume 69

NO. 1. JANUARY 1993

From the Editor
G. M. Shepherd 1

Visual Resolution and Sensitivity of Single Cells in the Primary Visual Cortex (V1) of a Nocturnal Primate (Bush Baby): Correlations With Cortical Layers and Cytochrome Oxidase Patterns
E. J. DeBruyn, V. A. Casagrande, P. D. Beck, and A. B. Bonds 3

Speed and Direction Selectivity of Macaque Middle Temporal Neurons
L. Lagae, S. Raiguel, and G. A. Orban 19

Development of Local Horizontal Interactions in Cat Visual Cortex Studied by Cross-Correlation Analysis
Y. Hata, T. Tsumoto, H. Sato, K. Hagihara, and H. Tamura 40

Output Organization of Intermediate Cerebellum of the Monkey
P. L. E. van Kan, J. C. Houk, and A. R. Gibson 57

Movement-Related Inputs to Intermediate Cerebellum of the Monkey
P. L. E. van Kan, A. R. Gibson, and J. C. Houk 74

An Investigation of the Coupling Between Respiration, Mastication, and Swallowing in the Awake Rabbit
D. H. McFarland and J. P. Lund 95

Anoxic Depression of Excitatory and Inhibitory Postsynaptic Potentials in Rat Neocortical Slices
A. S. Rosen and M. E. Morris 109

Whole-Cell Recording of Anoxic Effects on Hippocampal Neurons in Slices
L. Zhang and K. Krnjević 118

Analysis of Object Motion in the Ventral Part of the Medial Superior Temporal Area of the Macaque Visual Cortex
K. Tanaka, Y. Sugita, M. Moriya, and H.-A. Saito 128

Quisqualate and ACPD are Agonists for a Glutamate-Activated Current in Identified *Aplysia* Neurons
P. S. Katz and I. B. Levitan 143

Alterations in Membrane Potential After Axotomy at Different Distances From the Soma of an Identified Neuron and the Effect of Depolarization on Neurite Outgrowth and Calcium Channel Expression
R. C. Berdan, J. C. Easaw, and R. Wang 151

Activity-Mediated Changes in Feed-Forward Inhibition in the Dentate Commissural Pathway: Relationship to EPSP/Spike Dissociation in the Converging Perforant Path
R. A. Tomasulo and J. J. Ramirez 165

Responses of Trigeminal Brain Stem Neurons and the Digastric Muscle to Tooth-pulp Stimulation in Awake Cats
F. M. Boissonade and B. Matthews 174

Premotor Cortex of Monkeys: Set- and Movement-Related Activity Reflecting Amplitude and Direction of Wrist Movements
K. Kurata 187

Development of Glutamate and NMDA Sensitivity of Neurons Within the Cochlear Nuclear Complex of Kittens
E. J. Walsh, J. McGee, and J. L. Fitzakerley 201

The Postsynaptic Induction of Nonassociative Long-Term Depression of Excitatory Synaptic Transmission in Rat Hippocampal Slices
G. Christofi, A. V. Nowicky, S. R. Bolsover, and L. J. Bindman 219

Developmental Changes in NMDA and Non-NMDA Receptor–Mediated Synaptic Potentials in Rat Neocortex
E. C. Burgard and J. J. Hablitz 230
Analysis of Voltage-Dependent Membrane Currents in Spatially Extended Neurons From Point-Clamp Data
W. Müller and H. D. Lux 241
Membrane Currents Evoked by Afferent Fiber Stimulation in Rat Piriform Cortex. I. Current Source-Density Analysis
K. L. Ketchum and L. B. Haberly 248
Membrane Currents Evoked by Afferent Fiber Stimulation in Rat Piriform Cortex. II. Analysis With a System Model
K. L. Ketchem and L. B. Haberly 261

RAPID PUBLICATIONS

Cat Hindlimb Muscles Exert Substantial Torques Outside the Sagittal Plane
J. H. Lawrence III, T. R. Nichols, and A. W. English 282
$GABA_b$ Receptors Are Coupled to a Barium-Insensitive Outward Rectifying Potassium Conductance in Premotor Respiratory Neurons
P. G. Wagner and M. S. Dekin 286
Postnatal Development of a Persistent Na^+ Current in Pyramidal Neurons From Rat Sensorimotor Cortex
C. Alzheimer, P. C. Schwindt, and W. E. Crill 290
Spike-Like Potentials in the Axons of Nonspiking Photoreceptors
M. Weckström, M. Järvilehto, and K. Heimonen 293
Functional Imaging of Human Motor Cortex at High Magnetic Field
S.-G. Kim, J. Ashe, A. P. Georgopoulos, H. Merkle, J. M. Ellermann, R. S. Menon, S. Ogawa, and K. Uğurbil 297

NO. 2. FEBRUARY 1993

Three-Dimensional Organization of Optokinetic Responses in the Rabbit
H. S. Tan, J. Van der Steen, J. I. Simpson, and H. Collewijn 303
Nociceptive Neurons of the Raccoon Lateral Thalamus
D. A. Simone, M. E. Hanson, N. A. Bernau, and B. H. Pubols, Jr. 318
Neural Circuit Tuning Fly Visual Interneurons to Motion of Small Objects. I. Dissection of the Circuit of Pharmacological and Photoinactivation Techniques
A.-K. Warzecha, M. Egelhaaf, and A. Borst 329
Neural Circuit Tuning Fly Visual Neurons to Motion of Small Objects. II. Input Organization of Inhibitory Circuit Elements Revealed by Electrophysiological and Optical Recording Techniques
M. Egelhaaf, A. Borst, A.-K. Warzecha, S. Flecks, and A. Wildemann 340
Properties of Synaptic Transmission From Photoreceptors to Bipolar Cells in the Mudpuppy Retina
H. G. Kim and R. F. Miller 352
Kinetic Properties of a Slow Apamin-Insensitive Ca^{2+}-Activated K^+ Current in Guinea Pig Vagal Neurons
P. Sah 361
Organization of Response Areas in Ferret Primary Auditory Cortex
S. A. Shamma, J. W. Fleshman, P. R. Wiser, and H. Versnel 367
Relation Between Electrophysiological Class and Neuropeptide Content of Guinea Pig Sympathetic Prevertebral Neurons
J. R. Keast, E. M. McLachlan, and R. L. Meckler 384
Receptive Properties of Myelinated Primary Afferents Innervating the Inflamed Urinary Bladder of the Cat
H.-J. Häbler, W. Jänig, and M. Koltzenburg 395

Distribution of Ionic Currents in the Soma and Growing Region of an Identified Peptidergic Neuron in Defined Culture
D. E. R. Meyers 406
Groupings of Nonpyramidal and Pyramidal Cells With Specific Physiological and Morphological Characteristics in Rat Frontal Cortex
Y. Kawaguchi 416
Site of Synaptic Depression During Hypoxia: A Patch-Clamp Analysis
N. Hershkowitz, A. N. Katchman, and S. Veregge 432
Maximum Shortening Speed of Motor Units of Various Types in Cat Lumbrical Muscles
J. Petit, M. Chua, and C. C. Hunt 442
Binaural Processing of Sound Pressure Level in Cat Primary Auditory Cortex: Evidence for a Representation Based on Absolute Levels Rather Than Interaural Level Differences
M. N. Semple and L. M. Kitzes 449
Focal Selectivity for Binaural Sound Pressure Level in Cat Primary Auditory Cortex: Two-Way Intensity Network Tuning
M. N. Semple and L. M. Kitzes 462
Multiple-Tooth Receptive Fields of Single Human Periodontal Mechanoreceptive Afferents
M. Trulsson 474
Gustatory Neural Coding in the Monkey Cortex: The Quality of Sweetness
C. R. Plata-Salamán, T. R. Scott, and V. L. Smith-Swintosky 482
The K^+ Channel Opener Diazoxide Enhances Glutamatergic Currents and Reduces GABAergic Currents in Hippocampal Neurons
V. Crépel, C. Rovira, and Y. Ben-Ari 494
Gravitoinertial Force Level Influences Arm Movement Control
J. Fisk, J. R. Lackner, and P. DiZio 504
Pharmacologically Induced Elements of the Hunting and Feeding Behavior in the Pteropod Mollusk *Clione limacina*. I. Effects of GABA
Y. I. Arshavsky, T. G. Deliagina, G. N. Gamkrelidze, G. N. Orlovsky, Y. V. Panchin, L. B. Popova, and O. V. Shupliakov 512
Pharmacologically Induced Elements of the Hunting and Feeding Behavior in the Pteropod Mollusk *Clione limacina*. II. Effects of Physostigmine
Y. I. Arshavsky, T. G. Deliagina, G. N. Gamkrelidze, G. N. Orlovsky, Y. V. Panchin, and L. B. Popova 522
Functional Differences Between Afferent Fibers in the Hypogastric and Pelvic Nerves Innervating Female Reproductive Organs in the Rat
K. J. Berkley, A. Robbins, and Y. Sato 533
Neuronal Responses to Stimulation of the Cervix, Uterus, Colon, and Skin in the Rat Spinal Cord
K. J. Berkley, C. H. Hubscher, and P. D. Wall 545
Responses of Neurons in and Near the Thalamic Ventrobasal Complex of the Rat to Stimulation of Uterus, Cervix, Vagina, Colon, and Skin
K. J. Berkley, G. Guilbaud, J.-M. Benoist, and M. Gautron 557
Coordination of Cortically Induced Rhythmic Jaw and Tongue Movements in the Rabbit
Z. J. Liu, Y. Masuda, T. Inoue, H. Fuchihata, A. Sumida, K. Takada, and T. Morimoto 569
Potentiation of NMDA Receptor–Mediated Transmission in Turtle Cerebellar Granule Cells by Activation of Metabotropic Glutamate Receptors
G. A. Kinney and N. T. Slater 585
Trigeminal Premotor Neurons in the Bulbar Parvocellular Reticular Formation Participating in Induction of Rhythmical Activity of Trigeminal Motoneurons by Repetitive Stimulation of the Cerebral Cortex in the Guinea Pig
S. Nozaki, A. Iriki, and Y. Nakamura 595

Neural Correlates of Olfactory Learning Paradigms in an Identified Neuron in the Honeybee Brain
J. Mauelshagen 609

RAPID PUBLICATIONS

Cholinergic Modulation of Synaptic Inhibition in the Guinea Pig Hippocampus In Vitro: Excitation of GABAergic Interneurons and Inhibition of GABA-Release
J. C. Behrends and G. ten Bruggencate 626
Discrimination of Post- and Presynaptic $GABA_B$ Receptor–Mediated Responses by Tetrahydroaminoacridine in Area CA3 of the Rat Hippocampus
N. A. Lambert and W. A. Wilson 630
Down-Regulation of Protein Kinase C and Kinase Inhibitors Dissociate Short- and Long-Term Enhancement Produced by One-Trial Conditioning of *Hermissenda*
T. Crow and J. Forrester 636
Properties of Superior Vestibular Nucleus Neurons Projecting to the Cerebellar Flocculus in the Squirrel Monkey
Y. Zhang, A. M. Partsalis, and S. M. Highstein 642

NO. 3. MARCH 1993

The Spinal GABA System Modulates Burst Frequency and Intersegmental Coordination in the Lamprey: Differential Effects of $GABA_A$ and $GABA_B$ Receptors
J. Tegnér, T. Matsushima, A. El Manira, and S. Grillner 647
Responses of Single Hamster Parabrachial Neurons to Binary Taste Mixtures: Mutual Suppression Between Sucrose and QHCl
M. B. Vogt and D. V. Smith 658
The Morphology of the Sensory Neuron in the Cockroach Femoral Tactile Spine
A. S. French, A. R. Klimaszewski, and L. L. Stockbridge 669
$GABA_B$ Autoreceptors Mediate Activity-Dependent Disinhibition and Enhance Signal Transmission in the Dentate Gyrus
D. D. Mott, C.-W. Xie, W. A. Wilson, H. S. Swartzwelder, and D. V. Lewis 674
Passive Current Flow and Morphology in the Terminal Arborizations of the Posterior Pituitary
M. B. Jackson 692
Wide Dynamic Range but not Nociceptive-Specific Neurons Encode Multidimensional Features of Prolonged Repetitive Heat Pain
R. C. Coghill, D. J. Mayer, and D. D. Price 703
Facilitation and Delayed Release at About 0°C at the Frog Neuromuscular Junction: Effects of Calcium Chelators, Calcium Transport Inhibitors, and Okadaic Acid
W. Van der Kloot and J. Molgó 717
Responses of the Starburst Amacrine Cells to Moving Stimuli
D. M. O'Malley and R. H. Masland 730
Thalamic VPM Nucleus in the Behaving Monkey. I. Multimodal and Discriminative Properties of Thermosensitive Neurons
M. C. Bushnell, G. H. Duncan, and N. Tremblay 739
Thalamic VPM Nucleus in the Behaving Monkey. II. Response to Air-Puff Stimulation During Discrimination and Attention Tasks
N. Tremblay, M. C. Bushnell, and G. H. Duncan 753
Opponent Effects of Potassium on $GABA_A$-Mediated Postsynaptic Inhibition in the Rat Hippocampus
M. S. Jensen, E. Cherubini, and Y. Yaari 764
Contribution of the Monkey Corticomotoneuronal System to the Control of Force in Precision Grip
M. A. Maier, K. M. B. Bennett, M.-C. Hepp-Reymond, and R. N. Lemon 772

Smooth Eye Movements Elicited by Microstimulation in the Primate Frontal Eye Field
J. P. Gottlieb, C. J. Bruce, and M. G. MacAvoy 786
Effect of Eye Position Within the Orbit on Electrically Elicited Saccadic Eye Movements: A Comparison of the Macaque Monkey's Frontal and Supplementary Eye Fields
G. S. Russo and C. J. Bruce 800
Ion Channels in Spinal Cord Astrocytes In Vitro. III. Modulation of Channel Expression by Coculture With Neurons and Neuron-Conditioned Medium
C. L. Thio, S. G. Waxman, and H. Sontheimer 819
Enduring Alterations in Neurophysiological Taste Responses After Early Dietary Sodium Deprivation
M. B. Vogt and D. L. Hill 832
Response Properties of Single Units in the Dorsal Nucleus of the Lateral Lemniscus and Paralemniscal Zone of an Echolocating Bat
E. Covey 842
Effect of Cytoplasmic Chloride Concentration on Open-State Preference of Glycine-Activated Chloride Channels in Cultured Spinal Cord Cells
A. I. McNiven and A. R. Martin 860
Characterization of Responses of T_2–T_4 Spinal Cord Neurons to Esophageal Distension in the Rat
I. Euchner-Wamser, J. N. Sengupta, G. F. Gebhart, and S. T. Meller 868
Ionic Currents in Giant Motor Axons of the Jellyfish, *Aglantha digitale*
R. W. Meech and G. O. Mackie 884
Potassium Channel Family in Giant Motor Axons of *Aglantha digitale*
R. W. Meech and G. O. Mackie 894
Ventral Intraparietal Area of the Macaque: Anatomic Location and Visual Response Properties
C. L. Colby, J.-R. Duhamel, and M. E. Goldberg 902
A Molecularly Defined Cardiorespiratory Interneuron Expressing SDPFLRFamide/GDPFLRFamide in the Snail *Lymnaea:* Monosynaptic Connections and Pharmacology
D. R. Skingsley, K. Bright, N. Santama, J. van Minnen, M. J. Brierley, J. F. Burke, and P. R. Benjamin 915
Peptide Modulation of ACh Receptor Desensitization Controls Neurotransmitter Release From Chicken Sympathetic Neurons
D. C. Valenta, J. E. G. Downing, and L. W. Role 928
Nonlinear Stretch Reflex Interaction During Cocontraction
R. R. Carter, P. E. Crago, and P. H. Gorman 943
Effects of Low-Frequency Stimulation of the Superior Colliculus on Spontaneous and Visually Guided Saccades
P. W. Glimcher and D. L. Sparks 953
Monkey Superior Colliculus Represents Rapid Eye Movements in a Two-Dimensional Motor Map
K. Hepp, A. J. Van Opstal, D. Straumann, B. J. M. Hess, and V. Henn 965
Parametric Modeling of the Temporal Dynamics of Neuronal Responses Using Connectionist Architectures
S. C. Bankes and D. Margoliash 980

RAPID PUBLICATIONS

Dynamic Clamp: Computer-Generated Conductances in Real Neurons
A. A. Sharp, M. B. O'Neil, L. F. Abbott, and E. Marder 992
Contribution of Irregular Semicircular Canal Afferents to the Horizontal Vestibuloocular Response During Constant Velocity Rotation
D. E. Angelaki and A. A. Perachio 996

Activation of Metabotropic Glutamate Receptors Induces Long-Term Depression of GABAergic Inhibition in Hippocampus
Y.-B. Liu, J. F. Disterhoft, and N. T. Slater 1000

NO. 4. APRIL 1993

Computer Simulations of Motoneuron Firing Rate Modulation
C. J. Heckman and M. D. Binder 1005
PET Study of Voluntary Saccadic Eye Movements in Humans: Basal Ganglia–Thalamocortical System and Cingulate Cortex Involvement
L. Petit, C. Orssaud, N. Tzourio, G. Salamon, B. Mazoyer, and A. Berthoz 1009
Sound Direction Influences the Frequency-Tuning Characteristics of Neurons in the Frog Inferior Colliculus
D. M. Gooler, C. J. Condon, J.-H. Xu, and A. S. Feng 1018
Visually Induced Cross-Axis Postsaccadic Eye Drift
Z. Kapoula, D. A. Robinson, and L. M. Optican 1031
Serotonin-Operated Potassium Current in CA1 Neurons Dissociated From Rat Hippocampus
H. Uneyama, S. Ueno, and N. Akaike 1044
Effects of Contraction and Lactic Acid on the Discharge of Group III Muscle Afferents in Cats
L. I. Sinoway, J. M. Hill, J. G. Pickar, and M. P. Kaufman 1053
α-Adrenergic Modulation of Ionic Currents in Cultured Parasympathetic Neurons From Rat Intracardiac Ganglia
Z.-J. Xu and D. J. Adams 1060
Chemosensitivity and Sensitization of Nociceptive Afferents That Innervate the Hairy Skin of Monkey
K. D. Davis, R. A. Meyer, and J. N. Campbell 1071
Barbiturate Depresses Simple Spike Activity of Cerebellar Purkinje Cells After Climbing Fiber Input
Y. Sato, A. Miura, H. Fushiki, and T. Kawasaki 1082
Spatiotemporal Organization of Simple-Cell Receptive Fields in the Cat's Striate Cortex. I. General Characteristics and Postnatal Development
G. C. DeAngelis, I. Ohzawa, and R. D. Freeman 1091
Spatiotemporal Organization of Simple-Cell Receptive Fields in the Cat's Striate Cortex. II. Linearity of Temporal and Spatial Summation
G. C. DeAngelis, I. Ohzawa, and R. D. Freeman 1118
Comparison of Cerebellar and Motor Cortex Activity During Reaching: Directional Tuning and Response Variability
P. A. Fortier, A. M. Smith, and J. F. Kalaska 1136
Mechanisms Underlying Induction of Long-Term Potentiation in Rat Medial and Lateral Perforant Paths In Vitro
A. Colino and R. C. Malenka 1150
Physiological Properties of Motoneurons Innervating Different Muscle Unit Types in Rat Gastrocnemius
P. F. Gardiner 1160
Prenatal Development of the Receptive Fields of Individual Trigeminal Ganglion Cells in the Rat
N. L. Chiaia, W. R. Bauer, and R. W. Rhoades 1171
Functional Properties of Spinal Interneurons Activated by Muscular Free Nerve Endings and Their Potential Contributions to the Clasp-Knife Reflex
C. L. Cleland and W. Z. Rymer 1181
Bilateral Inhibition by Glycinergic Afferents in the Medial Superior Olive
B. Grothe and D. H. Sanes 1192
Coincidence Detection by Binaural Neurons in the Chick Brain Stem
A. W. Joseph and R. L. Hyson 1197

Human Flexor Reflex Modulation During Cycling
D. A. Brown and C. G. Kukulka 1212
A Model of Graded Synaptic Transmission for Use in Dynamic Network Simulations
E. De Schutter, J. D. Angstadt, and R. L. Calabrese 1225
Properties of a Presynaptic Metabotropic Glutamate Receptor in Rat Neostriatal Slices
D. M. Lovinger, E. Tyler, S. Fidler, and A. Merritt 1236
Responses of Inferior Colliculus Neurons to Time-Varying Interaural Phase Disparity: Effects of Shifting the Locus of Virtual Motion
M. W. Spitzer and M. N. Semple 1245
Voltage-Dependent Sodium and Calcium Currents of Rat Myenteric Neurons in Cell Culture
J. L. Franklin and A. L. Willard 1264
Epileptogenesis in Chronically Injured Cortex: In Vitro Studies
D. A. Prince and G.-F. Tseng 1276
Spontaneous Burst Firing in Cat Primary Auditory Cortex: Age and Depth Dependence and Its Effect on Neural Interaction Measures
J. J. Eggermont, G. M. Smith, and D. Bowman 1292
Visual-Response Properties of Units in the Turtle Cerebellar Granular Layer In Vitro
T. X. Fan, A. F. Rosenberg, and M. Ariel 1314
Electrophysiological Evidence for a Bisynaptic Retinocerebellar Pathway
M. Ariel and T. X. Fan 1323
Timing of Odor Stimulation Does Not Alter Patterning of Olfactory Bulb Unit Activity in Freely Breathing Rats
E. C. Sobel and D. W. Tank 1331
Changes in Serotonin-Induced Potentials During Spinal Cord Development
L. Ziskind-Conhaim, B. S. Seebach, and B.-X. Gao 1338
Intracellular Recordings From Morphologically Identified Neurons of the Basolateral Amygdala
D. G. Rainnie, E. K. Asprodini, and P. Shinnick-Gallagher 1350

RAPID PUBLICATIONS

Transient Extracellular Volume Reduction in Neural Lobe of Rat Hypophysis in Response to Neural Stalk Stimulation In Vitro and its Relationship to Extracellular Potassium
W. E. Armstrong and M. E. Rice 1363
A Cortical EEG Frequency With a REM-Specific Increase in Amplitude
I. G. Campbell and I. Feinberg 1368

NO. 5. MAY 1993

Interaction and Synchronization Between Two Abdominal Motor Systems in Crayfish
A. Chrachri and D. M. Neil 1373
Cartwheel and Superficial Stellate Cells of the Dorsal Cochlear Nucleus of Mice: Intracellular Recordings in Slices
S. Zhang and D. Oertel 1384
Giant Cells of the Dorsal Cochlear Nucleus of Mice: Intracellular Recordings in Slices
S. Zhang and D. Oertel 1398
Tuberculoventral Cells of the Dorsal Cochlear Nucleus of Mice: Intracellular Recordings in Slices
S. Zhang and D. Oertel 1409
Synaptic Mechanisms of Cortical Representational Plasticity: Somatosensory and Corticocortical EPSPs in Reorganized Raccoon SI Cortex
P. Zarzecki, S. Witte, E. Smits, D. C. Gordon, P. Kirchberger, and D. D. Rasmusson 1422
Properties and Modulation of a Calcium-Activated Potassium Channel in Rat Olfactory Bulb Neurons
T. M. Egan, D. Dagan, and I. B. Levitan 1433

Time-Varying Mechanical Behavior of Multijointed Arm in Man
F. Lacquaniti, M. Carrozzo, and N. A. Borghese 1443
Effects of Vasoactive Intestinal Polypeptide on the Response Properties of Cells in Area 17 of the Cat Visual Cortex
P. C. Murphy, K. L. Grieve, and A. M. Sillito 1465
The Neuropeptide Red Pigment Concentrating Hormone Affects Rhythmic Pattern Generation at Multiple Sites
P. S. Dickinson, C. Mecsas, J. Hetling, and K. Terio 1475
Dendritic Excitability and a Voltage-Gated Calcium Current in Locust Nonspiking Local Interneurons
G. Laurent, K. J. Seymour-Laurent, and K. Johnson 1484
Neural Processing in a Three-Choice Reaction-Time Task: A Study Using Cerebral Evoked-Potentials and Single-Trial Analysis in Normal Humans
T. A. Ortiz, D. S. Goodin, and M. J. Aminoff 1499
Long-Term Dysfunctions of Neural Stereoscopic Mechanisms After Unilateral Extraocular Muscle Proprioceptive Deafferentation
Y. Trotter, S. Celebrini, J.-C. Beaux, B. Grandjean, and M. Imbert 1513
Vagal Afferent Stimulation–Produced Effects on Nociception in Capsaicin-Treated Rats
K. Ren, M. Zhuo, A. Randich, and G. F. Gebhart 1530
Role of HCO_3^- Ions in Depolarizing $GABA_A$ Receptor–Mediated Responses in Pyramidal Cells of Rat Hippocampus
L. M. Grover, N. A. Lambert, P. A. Schwartzkroin, and T. J. Teyler 1541
Single Potassium Channel Currents Activated by Extracellular ATP in Developing Chick Skeletal Muscle: A Role for Second Messengers
S. A. Thomas and R. I. Hume 1556
Static and Dynamic Responses of Periodontal Ligament Mechanoreceptors and Intradental Mechanoreceptors
W. K. Dong, T. Shiwaku, Y. Kawakami, and E. H. Chudler 1567
Rhythmic Patterns Evoked in Locust Leg Motor Neurons by the Muscarinic Agonist Pilocarpine
S. Ryckebusch and G. Laurent 1583
Calcium Currents in Acutely Isolated Human Neocortical Neurons
R. J. Sayer, A. M. Brown, P. C. Schwindt, and W. E. Crill 1596
Nucleus Z: A Somatosensory Relay to Motor Thalamus
R. Mackel and E. Miyashita 1607
Rate of Rise of the Cumulative Depolarization Evoked by Repetitive Stimulation of Small-Caliber Afferents Is a Predictor of Action Potential Windup in Rat Spinal Neurons In Vitro
L. G. Sivilotti, S. W. N. Thompson, and C. J. Woolf 1621
Potassium Currents and Their Modulation by Muscarine and Substance P in Neuronal Cultures From Adult Guinea Pig Celiac Ganglia
S. Vanner, R. J. Evans, S. G. Matsumoto, and A. Surprenant 1632
Early Postnatal Development of Visual Function in Ganglion Cells of the Cat Retina
J. S. Tootle 1645
Two Modes of Interspike Interval Shortening by Brief Transient Depolarizations in Cat Neocortical Neurons
A. D. Reyes and E. E. Fetz 1661
Effects of Transient Depolarizing Potentials on the Firing Rate of Cat Neocortical Neurons
A. D. Reyes and E. E. Fetz 1673
Cutaneous Sensory Receptors in the Rat Foot
J. W. Leem, W. D. Willis, and J. M. Chung 1684
Differences in Response Properties of Neurons Between Two Delay-Tuned Areas in the Auditory Cortex of the Mustached Bat
H. Edamatsu and N. Suga 1700

Delay Lines and Amplitude Selectivity are Created in Subthalamic Auditory Nuclei: the Brachium of the Inferior Colliculus of the Mustached Bat
N. Kuwabara and N. Suga 1713
Wipe and Flexion Reflexes of the Frog. I. Kinematics and EMG Patterns
J. L. Schotland and W. Z. Rymer 1725
Wipe and Flexion Reflexes of the Frog. II. Response to Perturbations
J. L. Schotland and W. Z. Rymer 1736
Actions of 5-Hydroxytryptamine on Neurons of the Rat Cingulate Cortex
E. Tanaka and R. A. North 1749
Divalent Cations Block the Cyclic Nucleotide-Gated Channel of Olfactory Receptor Neurons
F. Zufall and S. Firestein 1758

RAPID PUBLICATIONS

Miniature Excitatory Synaptic Currents Corrected for Dendritic Cable Properties Reveal Quantal Size and Variance
D. Ulrich and H.-R. Lüscher 1769
Anoxia-Induced LTP of Isolated NMDA Receptor-Mediated Synaptic Responses
V. Crepel, C. Hammond, K. Krnjevic, P. Chinestra, and Y. Ben-Ari 1774
Free Nerve Ending Terminal Morphology is Fiber Type Specific for Aδ and C Fibers Innervating Rabbit Corneal Epithelium
M. B. MacIver and D. L. Tanelian 1779
Timing of Medullary Late-Inspiratory Neuron Discharges: Vagal Afferent Effects Indicate Possible Off-Switch Function
M. I. Cohen, W.-X. Huang, R. Barnhardt, and W. R. See 1784

NO. 6. JUNE 1993

Memory Representations Underlying Motor Commands Used During Manipulation of Common and Novel Objects
A. M. Gordon, G. Westling, K. J. Cole, and R. S. Johansson 1789
Converging Influences from Visual, Auditory, and Somatosensory Cortices Onto Output Neurons of the Superior Colliculus
M. T. Wallace, M. A. Meredith, and B. E. Stein 1797
Gustatory Neural Coding in the Amygdala of the Alert Macaque Monkey
T. R. Scott, Z. Karadi, Y. Oomura, H. Nishino, C. R. Plata-Salaman, L. Lenard, B. K. Giza, and S. Aou 1810
Muscarinic Acetylcholine Receptors Modulate the Excitability of an Identified Insect Motoneuron
B. A. Trimmer and J. C. Weeks 1821
Anatomic Organization of Evoked Potentials in Rat Parietotemporal Cortex: Somatosensory and Auditory Responses
D. S. Barth, J. Kithas, and S. Di 1837
Electrophysiological Characterization of Different Types of Neurons Recorded In Vivo in the Motor Cortex of the Cat. I. Patterns of Firing Activity and Synaptic Responses
A. Baranyi, M. B. Szente, and C. D. Woody 1850
Electrophysiological Characterization of Different Types of Neurons Recorded In Vivo in the Motor Cortex of the Cat. II. Membrane Parameters, Action Potentials, Current-Induced Voltage Responses and Electrotonic Structures
A. Baranyi, M. B. Szente, and C. D. Woody 1865
The Relationship of Monkey Frontal Eye Field Activity to Saccade Dynamics
M. A. Segraves and K. Park 1880
Nociceptive Responses in the Neostriatum and Globus Pallidus of the Anesthetized Rat
E. H. Chudler, K. Sugiyama, and W. K. Dong 1890

Dynamics of Reflex Cocontraction in Hermit Crab Abdomen: Experiments and a Systems Model
W. D. Chapple 1904
The Representation of Stimulus Familiarity in Anterior Inferior Temporal Cortex
L. Li, E. K. Miller, and R. Desimone 1918
Coherent Network Oscillations by Olfactory Interneurons: Modulation by Endogenous Amines
A. Gelperin, L. D. Rhines, J. Flores, and D. W. Tank 1930
Cultured Olfactory Interneurons From *Limax maximus*: Optical and Electrophysiological Studies of Transmitter-Evoked Responses
L. D. Rhines, P. G. Sokolove, J. Flores, D. W. Tank, and A. Gelperin 1940
Exploring Parameter Space in Detailed Single Neuron Models: Simulations of the Mitral and Granule Cells of the Olfactory Bulb
U. S. Bhalla and J. M. Bower 1948
Local Anesthetics Block Transient Outward Potassium Currents in Rat Neocortical Neurons
M. Andreasen and J. J. Hablitz 1966
Lobster Stomatogastric Neurons in Primary Culture. I. Basic Characteristics
Y. V. Panchin, Y. I. Arshavsky, A. Selverston, and T. A. Cleland 1976
Modulation of Identified Stomatogastric Ganglion Neurons in Primary Cell Culture
G. G. Turrigiano and E. Marder 1993
Serotonin-Containing Neurons in Lobsters: Origins and Characterization of Inhibitory Postsynaptic Potentials
W. A. Weiger and P. M. Ma 2003
Serotonin-Containing Neurons in Lobsters: The Actions of γ-Aminobutyric Acid, Octopamine, Serotonin, and Proctolin on Activity of a Pair of Identified Neurons in the First Abdominal Ganglion
P. M. Ma and W. A. Weiger 2015
Excitatory Amino Acids Depress Synaptic Currents in Neonate Rat Sympathetic Preganglionic Neurons
S. Y. Wu and N. J. Dun 2030
Encoding of Head Acceleration in Vestibular Neurons. I. Spatiotemporal Response Properties to Linear Acceleration
G. A. Bush, A. A. Perachio, and D. E. Angelaki 2039
Effects of Soma Isolation on Outward Currents Measured Under Voltage Clamp in Spiny Lobster Stomatogastric Motorneurons
D. K. Hartline, D. V. Gassie, and B. R. Jones 2056
An Electrophysiological Study of Dorsal Horn Neurons in the Spinal Cord of Rats With an Experimental Peripheral Neuropathy
J. M. A. Laird and G. J. Bennett 2072
Relative Contribution of Rod and Cone Inputs to Bipolar Cells and Ganglion Cells in the Tiger Salamander Retina
S. H. Hensley, X.-L. Yang, and S. M. Wu 2086
Identification of Glutamate Receptor Subtypes Mediating Inputs to Bipolar Cells and Ganglion Cells in the Tiger Salamander Retina
S. H. Hensley, X.-L. Yang, and S. M. Wu 2099
Reduced Control of Motor Output in a Human Hand Muscle of Elderly Subjects During Submaximal Contractions
M. E. Galganski, A. J. Fuglevand, and R. M. Enoka 2108
Small-Caliber Afferent Inputs Produce a Heterosynaptic Facilitation of the Synaptic Responses Evoked by Primary Afferent A-Fibers in the Neonatal Rat Spinal Cord In Vitro
S. W. N. Thompson, C. J. Woolf, and L. G. Sivilotti 2116
Properties of the Hyperpolarization-Activated Current in Rat Hippocampal CA1 Pyramidal Cells
G. Maccaferri, M. Mangoni, A. Lazzari, and D. DiFrancesco 2129

Calcium Conductances and Their Role in the Firing Behavior of Neonatal Rat Hypoglossal Motoneurons
F. Viana, D. A. Bayliss, and A. J. Berger 2137
Multiple Potassium Conductances and Their Role in Action Potential Repolarization and Repetitive Firing Behavior of Neonatal Rat Hypoglossal Motoneurons
F. Viana, D. A. Bayliss, and A. J. Berger 2150
The Peptide FMRFa Terminates a Discharge in Aplysia Bag Cell Neurons by Modulating Calcium, Potassium, and Chloride Conductances
T. Fisher, C.-H. Lin, and L. K. Kaczmarek 2164
Inhibition in ON-OFF Directionally Selective Ganglion Cells of the Rabbit Retina
F. R. Amthor and N. M. Grzywacz 2174
Facilitation in ON-OFF Directionally Selective Ganglion Cells of the Rabbit Retina
N. M. Grzywacz and F. R. Amthor 2188
CA3 Neuron Excitation and Epileptiform Discharge Are Sensitive to Osmolality
V. Saly and R. D. Andrew 2200
Position-Specific Adaptation in Complex Cell Receptive Fields of the Cat Striate Cortex
S. Marlin, R. Douglas, and M. Cynader 2209
Kinetic Study and Numerical Reconstruction of A-Type Current in Granule Cells of Rat Cerebellar Slices
R. Bardoni and O. Belluzzi 2222
Activity of Medullary Reticulospinal Neurons During Fictive Locomotion
M.-C. Perreault, T. Drew, and S. Rossignol 2232

RAPID PUBLICATIONS

Electrical Coupling of Mechanoreceptor Afferents in the Crayfish: A Possible Mechanism for Enhancement of Sensory Signal Transmission
A. El Manira, D. Cattaert, P. Wallén, R. A. DiCaprio, and F. Clarac 2248
Nonlinear Dynamics in a Model Neuron Provide a Novel Mechanism for Transient Synaptic Inputs to Produce Long-Term Alterations of Postsynaptic Activity
C. C. Canavier, D. A. Baxter, J. W. Clark, and J. H. Byrne 2252
Responses of Neurons in Primary Visual Cortex Are Modulated by Eye Position
T. G. Weyand and J. G. Malpeli 2258
Subject Index to Volume 69 2261
Author Index to Volume 69 2275